Non-CO_2 Greenhouse Gases: High-GWP Gases

Source/Sectors: Substitution of ODS/Household Refrigeration

Technology: Refrigerant recovery/recycling (C.1.1.1.1)

Description of the Technology:
Household refrigeration system typically consists of a hermetically-sealed circulation loop that contains the refrigerant and connects an evaporator, a condenser, and a compressor. Refrigerant loss occurs mainly due to mechanical damage of the evaporator coil (USEPA, 2001).

Practicing refrigerant recovery for reuse or destruction can significantly reduce HFCs emissions. Recovery options apply a refrigerant recovery device that transfers refrigerant into a storage container prior to servicing or disposing equipment. After the recovery process, the refrigerant contained in the storage container either is recharged back into the source equipment, cleaned through the use of recycling devices, purified for resale at a reclamation facilities, or disposed safely in an environmentally-safe manner (IEA, 2003, USEPA, 2001). These practices are already in baseline in many refrigeration systems because of the cost efficiency yielded by the reuse and re-sold processes; however, small equipments such as house refrigeration has less recoverable charges, thus being less cost effective. Yet, refrigerant recovery/recycling is believed to be the most feasible option to reduce HFC emissions (IEA, 2003).

Effectiveness: It can reduce total emissions by 95% (USEPA, 2001).

Implementability: Technically applicable in all regions.

Reliability: No risk and uncertainty associated with this option is recognized (IEA, 2003).

Maturity: Refrigerant recovery equipment is widely available and used extensively in developed countries. In some countries such as US, EU, and Canada, law requires refrigerant recovery. This option is assumed to be practiced at 80% in the baseline in developed countries, and 30% in developing countries (USEPA, 2006b).

Environmental Benefits: HFCs emission reduction

Cost Effectiveness:

Technology	Lifetime (yrs)	MP (%)	RE (%)	TA (%)	Capital cost	Annual cost	Benefits
Refrigerant recovery/recycling[1]	10	10	95	1-3	$26.19	$3.40	$1.69

Note: MP: market penetration; RE: reduction efficiency; TA: technical applicability; costs are in year 2000 US$/$MT_{CO2\text{-}eq.}$
1: CEC (2005)

Industry Acceptance Level: Widely practiced in developed countries. Although this option is widely accepted in developed countries, the penetration remains low in many developing countries, due to a lack of available capital infrastructure as well as a lack of legislation design. Therefore, further growth is especially expected in developing countries (IEA, 2003).

Limitations: Reduction efficiency is uncertain because it may vary depending on technician technique and equipment type (IEA, 2003).

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